

Mini-Max/ARM9260-E Single Board Computer

uSD/uSDHC Debian Installation Guide

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1. Overview

Thank you for your purchase of the Mini-Max/ARM9260-E Single Board Computer. Mini-Max/ARM9260-E is a powerful computer board that is capable of running high-level operating systems such as Linux.

This document is for advanced users who want to install Debian Linux system to micro SD/SDHC.

When Mini-Max/ARM9260-E is first powered, it goes through a boot sequence and executes various components in the following order:

- ROM boot loader (built-in ROM)
- AT91BootStrap (DataFlash)
- U-boot (DataFlash)
- Linux kernel (DataFlash)
- Root FS (Debian on micro uSD/uSDHC)

ROM boot loader is built into the AT91SAM9260 microcontroller and cannot be changed. As soon as the board is powered the ROM boot loader starts. It downloads and runs an application (AT91BootStrap) from external storage media (DataFlash) into internal SRAM. AT91BootStrap has been developed by BiPOM Electronics specifically for Mini-Max/ARM9260-E.

AT91BootStrap is responsible for initializing hardware such as DataFlash, SDRAM, digital outputs, and USART0 serial port.

AT91BootStrap downloads to SDRAM and passes control to U-Boot which is a powerful boot loader that resides also in DataFlash. U-Boot performs many low-level tasks such as reading Linux image from DataFlash, uncompressing Linux image to SDRAM, and passing control to Linux image in SDRAM.

U-Boot is open source system that may be upgraded from time to time by BiPOM Electronics for additional functionality.

Linux kernel and RootFS are the two main and largest components of the operating system.

When Linux kernel is started, it will mount uSD/uSDHC drive as RootFS.

uSD/uSDHC drive has to be TRIPLE partition.

The 1st partition has to be formatted to SWAP.

The 2nd partition has to be formatted to EXT2. Linux will mount it as RootFS.

The 3rd partition has to be formatted to FAT32. It can be used for user data.

It is necessary to use a PC Linux machine to format uSD/uSDHC drive, copy files, etc.

Windows users can install FREE Vmware player and run the Linux virtual machine.

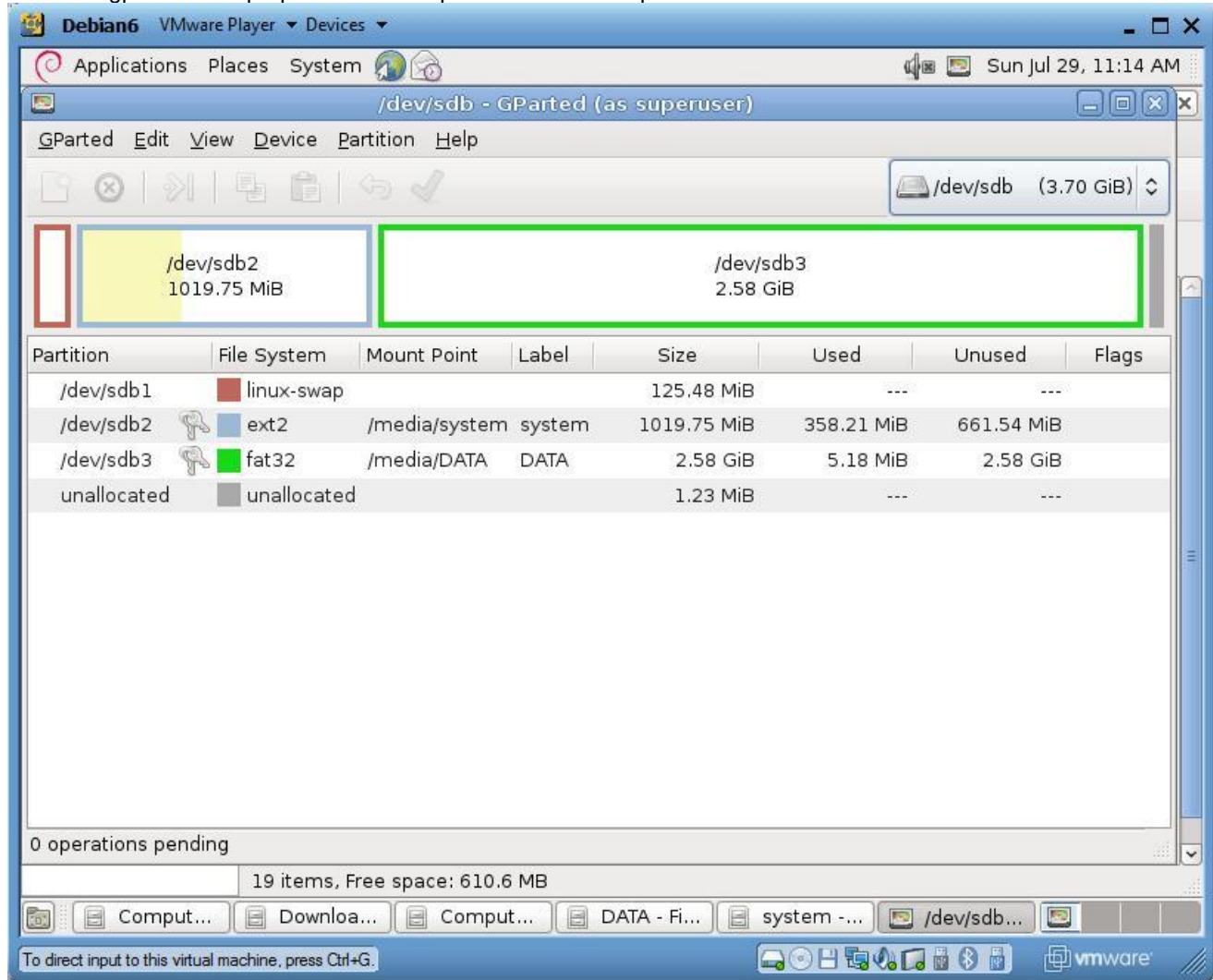
2. Debian RootFS.

2.1. To prepare a TRIPLE partition it is necessary to have a Linux/Debian native machine with a pre-installed 'gparted' package. If 'gparted' is not installed you can do that using the following command
apt-get install gparted

```
user@debian6:~$ su
Password:
root@debian6:/home/user# apt-get install gparted
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  gksu libcairomm-1.0-1 libgksu2-0 libglibmm-2.4-1c2a libgtkmm-2.4-1c2a
  libpangomm-1.4-1 sudo
Suggested packages:
  xfsprogs reiserfsprogs reiser4progs jfsutils ntfsprogs kpartx dmraid
The following NEW packages will be installed:
  gksu gparted libcairomm-1.0-1 libgksu2-0 libglibmm-2.4-1c2a
  libgtkmm-2.4-1c2a libpangomm-1.4-1 sudo
0 upgraded, 8 newly installed, 0 to remove and 4 not upgraded.
Need to get 3,910 kB of archives.
After this operation, 12.7 MB of additional disk space will be used.
Do you want to continue [Y/n]?
```

Press Y to install the package.

2.2. Run "gparted" and prepare a TRIPLE partition like on the picture below



2.3. Copy the prepared RootFS (**debian_rootfs_29Jul2012.tar.bz2**) to **/home/user/fs/debian** folder.
You can download it from BiPOM web site:

www.bipom.com/files/mmarm9260e/debian_rootfs_29Jul2012.tar.bz2

2.4. Untar the RootFS

```
tar -xvjf debian_rootfs_29Jul2012.tar.bz2
```

2.6. Copy all the files/folders from **/home/user/fs/debian/media/system** folder to EXT2 partition of uSD/uSDHC that is mounted to **/media/system**

```
cp -R /home/user/fs/debian/media/system/* /media/system
```

The RootFS is complete to run on Mini-Max/ARM9260-E.
Disconnect the uSD/uSDHC from Linux machine.

3. Linux kernel

3.1. Copy the prepared Linux kernel (**linux2.6.30.4_14Jun2012.tar.bz2**) to **/home/user/fs/debian** folder.

You can download it from BiPOM web site:

www.bipom.com/files/mmarm9260e/linux2.6.30.4_14Jun2012.tar.bz2

3.2. Untar the kernel

```
tar -xvzf linux2.6.30.4_14Jun2012.tar.bz2
```

3.3. Connect a USB Flash drive (formatted to FAT32) to Linux machine.

3.4. Copy all the files/folders from **/home/user/fs/debian/media/FAT** folder to ROOT of USB Flash drive.

3.5. Unmount USB Flash drive from Linux machine and connect to Mini-Max/ARM9260-E.

Run the Mini-Max/ARM9260-E board.

Press any key to get U-Boot prompt.

3.6. Execute the following commands

```
usb start; fatload usb 0:1 0x21000000 ulmage; cp.b 0x21000000 0xD0030000 0x400000
setenv bootcmd 'cp.b 0xD0030000 0x21000000 0x400000; bootm 0x21000000'
setenv bootargs 'mem=64M console=ttyS1,115200 root=/dev/mmcblk0p2 rw rootwait'
saveenv
```

```
U-Boot> usb start; fatload usb 0:1 0x21000000 ulmage; cp.b 0x21000000 0xD0030000 0x400000
(Re)start USB...
```

```
USB: scanning bus for devices... 2 USB Device(s) found
      scanning bus for storage devices... 1 Storage Device(s) found
reading ulmage
```

```
.....
1684776 bytes read
```

```
Copy to DataFlash... done
```

```
U-Boot> setenv bootcmd 'cp.b 0xD0030000 0x21000000 0x400000; bootm 0x21000000'
```

```
U-Boot> setenv bootargs 'mem=64M console=ttyS1,115200 root=/dev/mmcblk0p2 rw rootwait'
```

```
U-Boot> saveenv
```

```
Saving Environment to dataflash...
```

```
U-Boot>
```

3.7. Switch power off. Remove USB flash drive. Install the prepared uSDHC to the special holder on the board. Power the board.

Mini-Max/ARM-SAM9260 rev 1.08(10)

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U-Boot 2008.10 (Mar 1 2009 - 18:37:50)

DRAM: 64 MB

DataFlash:AT45DB642

Nb pages: 8192

Page Size: 1056

Size= 8650752 bytes

Logical address: 0xD0000000

Area 0: D0000000 to D0003FFF (RO) Bootstrap

Area 1: D0004000 to D0007FFF Environment

Area 2: D0008000 to D002FFFF (RO) U-Boot

Area 3: D0030000 to D042FFFF Kernel

Area 4: D0430000 to D083FFFF FS

In: serial

Out: serial

Err: serial

Net: macb0

macb0: PHYID1=0x0181

macb0: PHYID2=0xb8a0
macb0: DM9161 reset...
DM9161_BMCR Basic Mode Control Register = 0x3100
DM9161_BMSR Basic Mode Status Register = 0x7849
DM9161_PHYID1 PHY Identifier Register 1 = 0x0181
DM9161_PHYID2 PHY Identifier Register 2 = 0xb8a0
DM9161_ANAR Auto_Negotiation Advertisement Register = 0x01e1
DM9161_ANLPAR Auto_negotiation Link Partner Ability Register = 0x0de1
DM9161_ANER Auto-negotiation Expansion Register = 0x0000
DM9161_DSCR Specified Configuration Register = 0x0c14
DM9161_DSCSR Specified Configuration and Status Register = 0xf200
DM9161_10BTCSR 10BASE-T Configuration and Status Register = 0x5800
DM9161_MDINTR Specified Interrupt Register = 0x1f00
DM9161_RECR Specified Receive Error Counter Register = 0x0000
DM9161_DISCR Specified Disconnect Counter Register = 0x0000
DM9161_RLSR Hardware Reset Latch State Register = 0xd6e0
macb0: Autonegotiation complete
macb0: link up, 100Mbps full-duplex (lpa: 0x4de1)
Hit any key to stop autoboot: 0
Booting kernel from Legacy Image at 21000000 ...
Image Name:
Image Type: ARM Linux Kernel Image (gzip compressed)
Data Size: 1684712 Bytes = 1.6 MB
Load Address: 20008000
Entry Point: 20008000
Verifying Checksum ... OK
Uncompressing Kernel Image ... OK

Starting kernel ...

Linux version 2.6.30.4 (mini@mini-max) (gcc version 4.3.2 (Sourcery G++ Lite 2008q3-41)) #59 Thu Feb 16
19:27:18 EET 2012
CPU: ARM926EJ-S [41069265] revision 5 (ARMv5TEJ), cr=00053177
CPU: VIVT data cache, VIVT instruction cache
Machine: BiPOM ARM9260
Memory policy: ECC disabled, Data cache writeback
Clocks: CPU 198 MHz, master 99 MHz, main 18.432 MHz
Built 1 zonelists in Zone order, mobility grouping on. Total pages: 16256
Kernel command line: mem=64M console=ttyS1,115200 root=/dev/mmcblk0p2 rw rootwait
NR_IRQS:192
AT91: 96 gpio irqs in 3 banks
PID hash table entries: 256 (order: 8, 1024 bytes)
Console: colour dummy device 80x30
Dentry cache hash table entries: 8192 (order: 3, 32768 bytes)
Inode-cache hash table entries: 4096 (order: 2, 16384 bytes)
Memory: 64MB = 64MB total
Memory: 61468KB available (2928K code, 247K data, 112K init, 0K highmem)
Calibrating delay loop... 99.12 BogoMIPS (lpj=495616)
Mount-cache hash table entries: 512
CPU: Testing write buffer coherency: ok
net_namespace: 492 bytes
NET: Registered protocol family 16
AT91: No default serial console defined.
bio: create slab <bio-0> at 0
SCSI subsystem initialized
usbcore: registered new interface driver usbfs
usbcore: registered new interface driver hub
usbcore: registered new device driver usb
cfg80211: Calling CRDA to update world regulatory domain
NET: Registered protocol family 2
IP route cache hash table entries: 1024 (order: 0, 4096 bytes)
TCP established hash table entries: 2048 (order: 2, 16384 bytes)
TCP bind hash table entries: 2048 (order: 1, 8192 bytes)
TCP: Hash tables configured (established 2048 bind 2048)
TCP reno registered
NET: Registered protocol family 1
JFFS2 version 2.2. (NAND) 6 1 2001-2006 Red Hat, Inc.

ROMFS MTD (C) 2007 Red Hat, Inc.
msgmni has been set to 120
alg: No test for stdrng (krng)
io scheduler noop registered
io scheduler anticipatory registered (default)
atmel_usart.1: ttyS1 at MMIO 0xffff0000 (irq = 6) is a ATMEL_SERIAL
console [ttyS1] enabled
atmel_usart.2: ttyS2 at MMIO 0xffff4000 (irq = 7) is a ATMEL_SERIAL
brd: module loaded
Driver 'sd' needs updating - please use bus_type methods
tun: Universal TUN/TAP device driver, 1.6
tun: (C) 1999-2004 Max Krasnyansky <maxk@qualcomm.com>
STRIP: Version 1.3A-STUART.CHESHIRE (unlimited channels)
ohci_hcd: USB 1.1 'Open' Host Controller (OHCI) Driver
at91_ohci at91_ohci: AT91 OHCI
at91_ohci at91_ohci: new USB bus registered, assigned bus number 1
at91_ohci at91_ohci: irq 20, io mem 0x00500000
usb usb1: configuration #1 chosen from 1 choice
hub 1-0:1.0: USB hub found
hub 1-0:1.0: 2 ports detected
Initializing USB Mass Storage driver...
usbcore: registered new interface driver usb-storage
USB Mass Storage support registered.
udc: at91_udc version 3 May 2006
g_serial gadget: Gadget Serial v2.4
g_serial gadget: g_serial ready
mice: PS/2 mouse device common for all mice
rtc-at91sam9 at91_rtt.0: rtc core: registered at91_rtt as rtc0
IRQ 1/rtc0: IRQF_DISABLED is not guaranteed on shared IRQs
rtc-at91sam9 at91_rtt.0: rtc0: SET TIME!
i2c-gpio i2c-gpio: using pins 55 (SDA) and 56 (SCL)
Linux video capture interface: v2.00
AT91SAM9 Watchdog: sorry, watchdog is disabled
at91_wdt: probe of at91_wdt failed with error -5
sdhci: Secure Digital Host Controller Interface driver
sdhci: Copyright(c) Pierre Ossman
Advanced Linux Sound Architecture Driver Version 1.0.20.
ALSA device list:
No soundcards found.
TCP cubic registered
NET: Registered protocol family 10
NET: Registered protocol family 17
VFP support v0.3: not present
rtc-at91sam9 at91_rtt.0: hctosys: unable to read the hardware clock
Waiting for root device /dev/mmcblk0p2...
mmc0: host does not support reading read-only switch. assuming write-enable.
mmc0: new SDHC card at address 0002
mmcblk0: mmc0:0002 00000 3.70 GiB
mmcblk0: p1 p2 p3
VFS: Mounted root (ext2 filesystem) on device 179:2.
Freeing init memory: 112K
INIT: version 2.88 booting
Using makefile-style concurrent boot in runlevel S.
Start BiPOM Installer ...
VER: 1.01 02/15/2010
Detected board: Mini-Max/ARM9
/lib/modules/2.6.30.4/pca9698.ko OK
/lib/modules/2.6.30.4/macb.ko OK
/lib/modules/2.6.30.4/davicom.ko OK
/lib/modules/2.6.30.4/fb_sys_fops.ko OK
/lib/modules/2.6.30.4/syscopyarea.ko OK
/lib/modules/2.6.30.4/sysfillrect.ko OK
/lib/modules/2.6.30.4/sysimgblt.ko OK
/lib/modules/2.6.30.4/sysimgblt.ko OK
/lib/modules/2.6.30.4/fb.ko OK
/lib/modules/2.6.30.4/ili9325.ko OK
/lib/modules/2.6.30.4/sc16is7x2.ko OK

```
/lib/modules/2.6.30.4/mii.ko OK
/lib/modules/2.6.30.4/ax88796.ko OK
/lib/modules/2.6.30.4/asix.ko OK
/lib/modules/2.6.30.4/usbnet.ko OK
/lib/modules/2.6.30.4/dm9601.ko OK
/lib/modules/2.6.30.4/input-polldev.ko OK
/lib/modules/2.6.30.4/rt2x00lib.ko OK
/lib/modules/2.6.30.4/rt2x00usb.ko OK
/lib/modules/2.6.30.4/rt73usb.ko OK
/lib/modules/2.6.30.4/usbserial.ko OK
/lib/modules/2.6.30.4/ftdi_sio.ko OK
/lib/modules/2.6.30.4/sierra.ko OK
/lib/modules/2.6.30.4/cdc-acm.ko OK
/lib/modules/2.6.30.4/cdc_subset.ko OK
/lib/modules/2.6.30.4/hid.ko OK
/lib/modules/2.6.30.4/gspca_main.ko OK
/lib/modules/2.6.30.4/gspca_pac7311.ko OK
/lib/modules/2.6.30.4/gspca_zc3xx.ko OK
/lib/modules/2.6.30.4/uvcvideo.ko OK
/lib/modules/2.6.30.4/ldusb.ko OK
/lib/modules/2.6.30.4/at91adc.ko OK
INSTALLATION/CHECK PASSED
*****>>>>> REMAP <<<<<<*****
UDEV STARTED
Starting the hotplug events dispatcher: udevd.
Synthesizing the initial hotplug events...macb macb: invalid hw address, using random
MACB_mii_bus: probed
eth0: Atmel MACB at 0xffc4000 irq 21 (3a:e9:d7:21:5f:6e)
eth0: attached PHY driver [Generic PHY] (mii_bus:phy_addr=ffffff:00, irq=-1)
done.
Waiting for /dev to be fully populated...done.
Activating swap...Adding 128480k swap on /dev/mmcbk0p1. Priority:-1 extents:1 across:128480k SS
done.
Checking root file system...fsck from util-linux-ng 2.17.2
system: clean, 10139/65280 files, 91701/261056 blocks
done.
Cleaning up ifupdown....
Setting up networking....
Loading kernel modules...done.
Activating lvm and md swap...done.
Checking file systems...fsck from util-linux-ng 2.17.2
done.
Mounting local filesystems...done.
Activating swapfile swap...done.
Cleaning up temporary files....
Configuring network interfaces...done.
Cleaning up temporary files....
eth0: link up (100/Full)
Setting kernel variables ...done.
INIT: Entering runlevel: 2
Using makefile-style concurrent boot in runlevel 2.
Starting enhanced syslogd: rsyslogd.
Starting periodic command scheduler: cron.
Starting OpenBSD Secure Shell server: sshd.
```

Debian GNU/Linux 6.0 mmarm9 ttyS1

mmarm9 login:

You can login to the board as root (password is root) using either a serial console or SSH client (IP 192.168.1.211, PORT 22).